Monitoring Temperature Excursions in HPV Vaccine Management in Indonesia

Insights from Internet of Things Digitalization

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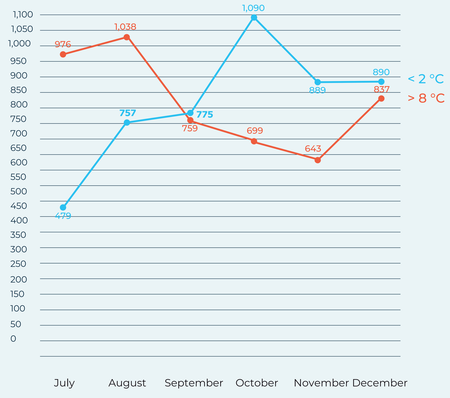
Introduction

The Human Papillomavirus (HPV) vaccine is a significant milestone in disease prevention, but its high attention requires strict measures to maintain its potency and efficacy. Since 2023, the government of Indonesia has been implementing an Electronic Immunization and Logistics Monitoring System (SMILE), which includes digitalizing storage temperature across vaccine cold chain points with alarm notifications. The digitalization of the Internet of Things (IoT) offers valuable insights and holds the potential to revolutionize the management of this vaccine.

Methods

We collected the temperature excursion from the SMILE application in 21 provinces based on the IoT availability in Indonesia and observed it from July 1 to December 31, 2023.

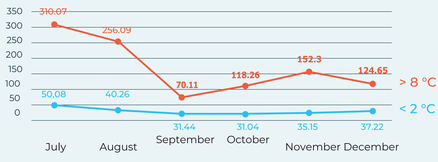
Results



Frequency of Vaccines Exposed to Temperatures < 2 °C and > 8 °C

FREQUENCY AND DURATION OF VACCINE TEMPERATURE DEVIATION IN 21 PROVINCES IN INDONESIA JULY TO DECEMBER 2023

JULY TO DECEMBER 2023
> 8 °C Total Duration: 1031.4 hours (171.9 hours/month)
< 2 °C Total Duration: 225.1 hours (37.5 hours/month)



Average Duration of Temperature Deviation: < 2 °C and > 8 °C

The frequency of the vaccines exposed to temperatures < 2 °C from July to December 2023 were 479, 757, 775, 1,090, 889, and 890 times, respectively. Also exposed to > 8 °C were 976, 1,038, 759, 699, 643, and 837 times. The average duration of temperature deviation was 37.5 hours to < 2 °C, and > 8 °C was 171.9 hours.

Discussion

From July to December 2023, the quantity of vaccines in Indonesia increased because of the school-based immunization program when the Rotavirus and HPV Vaccine were introduced nationwide in August 2023. This led to a cold chain storage capacity shortage at the Public Health Center (PHC) and suboptimal air circulation.

Conclusions

In the years ahead, the Immunization Directorate (EPI) must carefully coordinate the campaign and new vaccine introduction schedules to prevent any overlap. EPI needs to provide a comprehensive timeline for vaccine distribution to minimize temperature excursions, particularly considering the challenges of cold chain storage at PHC. Moreover, expanding the integration of IoT with SMILE to include currently unsupported provinces will enhance temperature monitoring practices.

Keywords: HPV Vaccine; IoT SMILE; Digitalization; Temperature excursions

Acknowledgments: We would like to appreciate the data from SMILE, which is managed by the Indonesian Ministry of Health (MoH) and the United Nations Development Programme (UNDP) with support from the Global Alliance for Vaccine and Immunization (Gavi)